

Type specimens.—Holotype female, 1 paratype and 1 allotype are deposited in the United States National Museum. Six paratypes and 2 allotypes are deposited in the Department of Entomology and Parasitology, University of California, Berkeley.

Type locality and collection data.—The species was collected from the nest of a turkey vulture (*Cathartes aura septentrionalis* Wied) in the foothills of the Sierra Nevada mountains, California, about 4 miles north of Shingle Springs, El Dorado County. The approximate elevation was 1,300 feet. The nest was located on the ground between large rocks at the summit of a small knoll. It consisted of small broken branches and twigs, and a rich assortment of organic matter, such as feathers, feces, and keratinous skin fragments. The nest was unoccupied at the time of collection, but had been in use earlier in the year.

The species was collected September 16, 1970, by E. T. Schmidtman of the University of California, Davis, after whom it is named. The collection data was provided by Mr. Schmidtman.

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TETRAPALPUS TRINIDADENSIS, A NEW GENUS AND SPECIES OF CAVE MOTH FROM TRINIDAD (LEPIDOPTERA: TINEIDAE)

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ABSTRACT—*Tetrapalpus*, n. gen., is proposed for *T. trinidadensis*, n. sp., described from Mt. Tamana Caves, Trinidad. The species is a troglomorphic moth, the larvae of which feed primarily on the guano of a fruit eating bat, *Phyllostomus hastatus hastatus* (Pallas).

A new genus and species of cave dwelling moth is described herein, in response to a request from Miss Johanna Darlington who first sent the species to me for determination. Miss Darlington collected the moths in the course of her field investigations on the fauna of the Tamana Caves. I am indebted to her for all material used in preparing this paper. A mimeographed, preliminary report on the Tamana Caves



Figs. 1-2. *Tetrapalpus trinidadensis*, n. sp.; 1, holotype, female, wing expanse 14 mm; 2, larval case, length 9 mm.

was issued by Darlington and Hill in 1966 and most of my comments concerning the type locality of *Tetrapalpus trinidadensis* are based on this reference.

Mt. Tamana, a limestone table mountain, at a maximum elevation of 1,009 feet is the highest peak of the Central Range and is located in Tamana Ward, St. Andrew County, two miles east of Four Roads, Trinidad. The Tamana Caves are known to consist of at least two separate solution caverns situated on the Northwest slope of Mt. Tamana at an elevation of 600 to 700 feet. The specimens described in this paper were collected only in the larger of the two caves; henceforth to be referred to as the "Tamana Main Cave," in accordance with Darlington's and Hill's terminology.

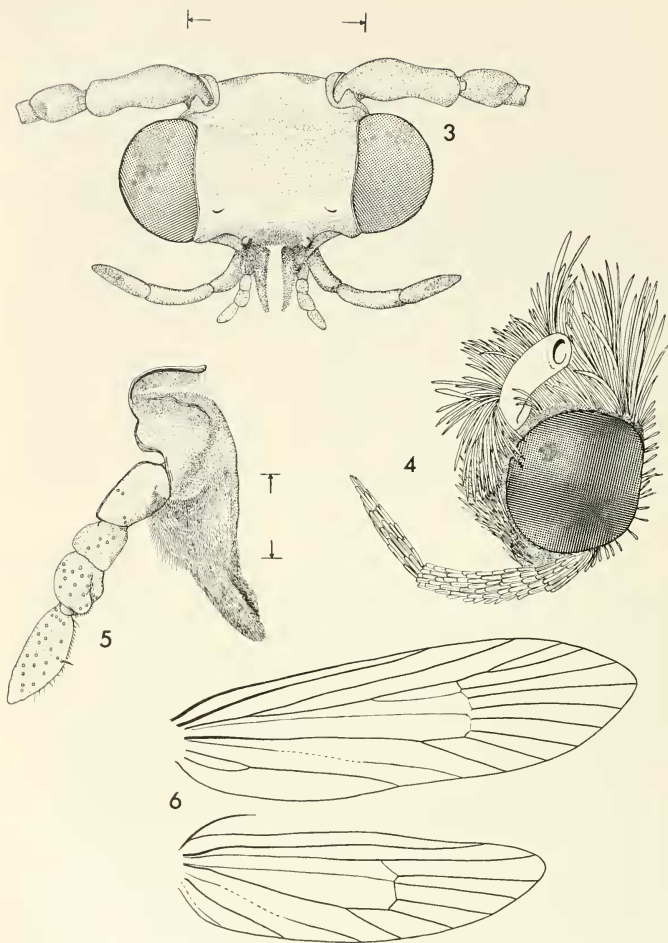
Tamana Main Cave is approximately a quarter mile in length and has a small stream flowing through it. Usually the cave is entered via a rope or ladder through the main chimney which has a vertical drop of about 17 feet. The densest concentrations of the moth were observed approximately 60 feet upstream (toward the main entrance of the cave) from the chimney area, and about 130 feet from the main entrance.

The smaller of the two known Tamana caves, usually referred to simply as the Dry Cave, is located approximately fifty yards further up the mountain side. As its name indicates, there is no water in the cave. To date, no moths have been collected from this cave.

Surprisingly little interest has been shown toward cave dwelling Lepidoptera in sharp contrast to other orders of insects containing cavernicolous forms. The paucity of research in this area probably is due largely to the rather different and perhaps slightly more tedious methods for collecting suitable material, as well as to the pronounced scarcity of lepidopterists with any interests along these lines.

Wolf (1934-1938) lists 31 species of Lepidoptera from caves, but some of these may have only been accidental strays. Few cavernicolous Lepidoptera have been described (Diakonoff, 1951) or reported in recent years. Those that have been mentioned in the literature of late rarely are positively identified, reflecting, again, both the poor condition of the material being sent to specialists for identification as well as the immature state of our knowledge of the fauna.

In an attempt to remedy this situation, I have initiated a world study on cave dwelling Lepidoptera and would like to take this opportunity to request study material from anyone who has collected, or is willing to collect Lepidoptera inside caves. The adults need not have their wings spread, but they should be pinned squarely through the thorax and *not* preserved in alcohol. Intensive collecting in the future is expected to reveal a number of new forms, such as the one described below.



Figs. 3-6. *Tetrapalpus trinidadensis*, n. sp.: 3, frontal view of head; 4, lateral view of head; 5, right maxilla; 6, wing venation. Scale = 0.5 mm (fig. 3), 0.1 mm (fig. 5).

Tetrapalpus, n. gen.

TYPE SPECIES.—*Tetrapalpus trinidadensis*, n. sp.

ADULT.—Small, slender moths; wing expanse approximately 10–15 mm.

Head (figs. 3–5): Vestiture rough. Antennae relatively long, moniliform, smooth scaled, with a single scale row completely encircling each segment; pecten absent; sensory setae rather sparse, scattered, short, length less than one half diameter of flagellum. Ocelli absent. Compound eyes large, nearly spherical, naked. Mandibles present. Maxillary palpi short, less than one half the length of labial palpi, four segmented; basal and terminal segments the longest and approximately equal in length; second and third segments the shortest, each approximately one half the length of terminal segment. Tongue densely pubescent, short, approximately two thirds the length of maxillary palpi. Labial palpi three segmented; all segments of approximately equal lengths, smooth scaled, without conspicuous, erect hairlike setae.

Thorax: Wings (fig. 6) relatively narrow. Forewings 12-veined; 11 arising from basal fifth of discal cell; 9 and 10 variable, usually stalked up to one half their length, but may be narrowly separate or connate or shortly stalked; accessory cell present; base of medius undivided within cell. Hindwing 8-veined, all veins arising separate from cell; base of medius undivided within cell. Legs with tarsal segments relatively long and slender; prothoracic leg with tibia distinctly shorter than first tarsal segment; epiphysis present, one half the length of foretibia.

Male genitalia: Uncus simple, acute. Gnathos mostly divided, two arms connected only by a membranous sheet. Tegumen relatively narrow dorsally, broadened laterally and forming a broad ring ventrally. Saccus well developed, elongate. Aedeagus simple, relatively slender and elongate; cornuti absent.

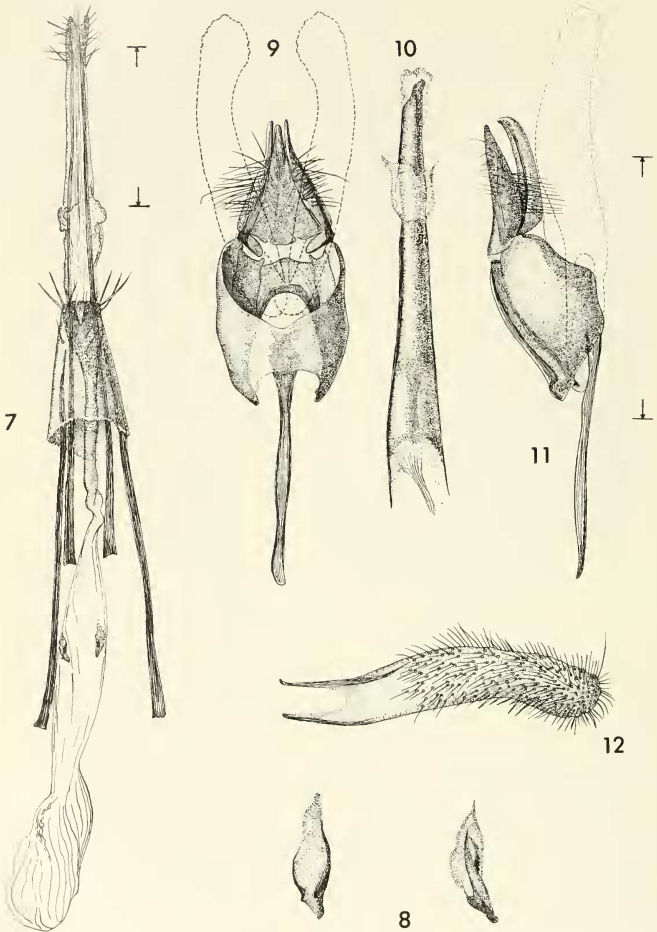
Female genitalia: Ovipositor elongate, telescoping. Anterior and posterior apophysis greatly extended. Ductus bursae slender, relatively short. Corpus bursae completely membranous, elongate, relatively narrow, a pair of signa present.

DISCUSSION.—As far as I have been able to determine, *Tetrapalpus trinidadensis* has no known close relatives. Cave dwelling moths which I have examined to date from other parts of the world appear abundantly distinct and only distantly related. Very few genera of Tineidae normally demonstrate a stalking of veins 9 and 10 in the forewing and those that do may be easily distinguished by other features. For example, *Barymochtha* Meyrick possesses 12 veins in the forewing with 9 and 10 stalked, but in addition to having a much differently shaped wing, *Barymochtha* lacks an accessory cell. *Tetrapalpus* may be further distinguished from such widespread genera as *Tinea*, which presently contains most of the described guanobious species, by the four segmented maxillary palpus—a character which has suggested its generic name.

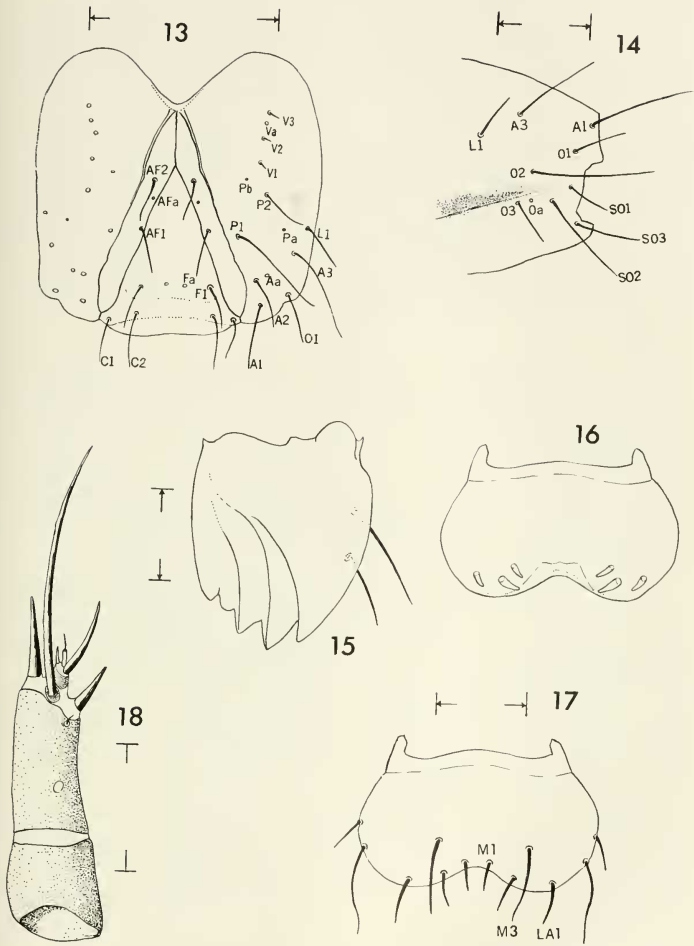
Tetrapalpus trinidadensis, n. sp.

ADULT (fig. 1).—Entire body unicolorous, brownish. Wing expanse: ♂, 9.5–10.5 mm; ♀, 13–15 mm.

Head (figs. 3–5): Light brown to tan; scales hairlike with acute apices. An-



Figs. 7-12. *Tetrapalpus trinidadensis*, n. sp.: 7, female genitalia; 8, signa; 9, male genitalia, ventral view; 10, aedeagus; 11, male genitalia, lateral view; 12, right valve, lateral view. Scale = 0.5 mm.



Figs. 13-18. *Tetrapalpus trinidadensis*, n. sp., larval structures: 13, head, dorsal view; 14, ocellar region of right side of head; 15, ventral view of right mandible; 16, ventral view of labrum; 17, dorsal view of labrum; 18, antenna. Scale = 0.5 mm (fig. 13), 0.2 mm (fig. 14), 0.1 mm (figs. 15, 17).

tennae unicolorous, light to medium brown, elongate, slightly exceeding forewing in length. Labial palpi medium brown to pale fuscous.

Thorax: Forewings, legs and dorsum of thorax light brown with slight bronzy iridescence. Venter of thorax lighter in color, pale tan to light gray; tibial fringe of metathoracic legs silvery gray. Hindwings light gray.

Abdomen: Light brown above; paler, more whitish beneath.

Male genitalia (figs. 9–12): Uncus broadly conical. Lateral arms of gnathos partially separate; apices bluntly pointed. Tegumen expanded laterally; anterior margin extended anteriorly, angulate. Vinculum with anterior margin deeply excavated. Saccus rodlike, approximately $2 \times$ length of uncus. Aedeagus broad at anterior end, gradually tapering posteriorly; length almost twice that of saccus.

Female genitalia (figs. 7, 8): Lamella antevaginalis with a deep, broad, V-shaped median cleft. Ductus bursae with a slight collarlike thickening about midway along its length. Corpus bursae greatly lengthened and relatively slender; signa of small size, approximately symmetrical, of an irregular, somewhat elliptical outline.

LARVA (figs. 13–24).—Length of largest larva 10 mm.

Head (figs. 13–18, 22): Dark brown with a short, longitudinal black stripe at level of ocellar setae extending to O2. Ocelli absent. A2 midway between Aa and adfrontal suture. AFa about midway between AF1 and AF2, although usually closer to AF2. Labrum with M3 well separated from external margin; all other setae closely bordering margin.

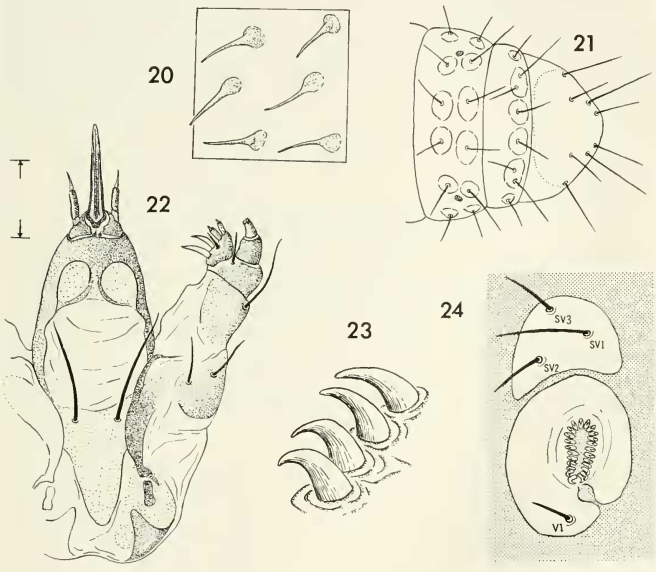
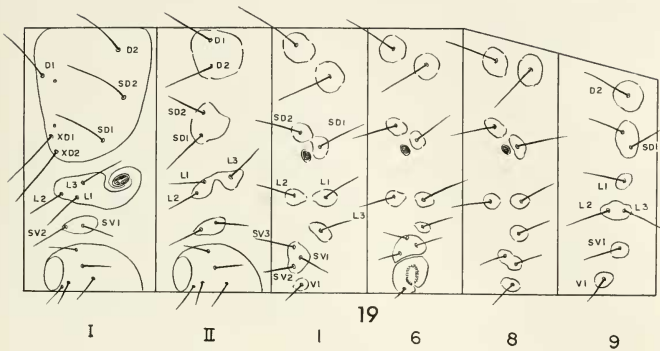
Thorax (fig. 19): Prothorax with tergal, plural and sternal plates dark reddish brown. Sclerites of legs pale brownish. All coxae separated, narrowly so on prothorax and becoming progressively further apart on meso- and metathorax. Integument white or nearly so. Prothorax with L1 below and between L2 and L3. Thoracic pleura with L1, L2 and L3 together on same pinnaculum.

Abdomen (figs. 19–21, 23, 24): Pinnacula only slightly darker than whitish integument; integument densely covered with minute spinules. Setae D1 and D2 of first eight segments borne on separate pinnacula. SD1 and SD2 usually arising from separate pinnacula on segments 1 to 8, although nearly united on first segment. Crochets on segments 3 to 6 uniordinal and arranged in a compact uniserial circle, numbering usually 22–26; crochets on anal prolegs similar except arranged in a much larger circle with a broad posterior interruption and numbering approximately 19–23. SV1, SV2 and SV3 of abdominal prolegs borne on same pinnaculum and separated from plate bearing both VI and crochets. Ninth segment with D1 and SD1 arising from same pinnaculum.

LARVAL CASE (fig. 2).—Relatively broad and distinctly depressed, slightly broader at middle; both ends rounded and open; openings slitlike, extending transversely at either end and inwards toward center about 1 mm on either side; ventral and dorsal margins of openings coincident, not overlapping. Texture of case rough, covered with dark fragments of soil, plants, and guano. Dimensions of largest case: 10 mm long, 3 mm wide, and 1.75 mm thick.

HOLOTYPE.—Mt. Tamana Main Cave, Trinidad, ♀, reared from larva collected by J. Darlington May 28, 1968, USNM 71430; in the U.S. National Museum.

PARATYPES.—Same data as holotype, 11 ♂, 14 ♀, 7 larvae, 9 larval cases (USNM).



Figs. 19-24, *Tetrapalpus trinidadensis*, n. sp., larval structures: 19, setae (left side) of prothorax, mesothorax, and abdominal segments 1, 6, 8, and 9; 20, microtrichia of sixth abdominal tergite (approximately 1,400 \times); 21, dorsal view of eighth, ninth and tenth abdominal tergite; 22, ventral view of labium and left maxilla; 23, detail view of crochets; 24, left proleg of seventh abdominal segment.

HOST.—Coprophagous, primarily on guano of fruit eating bat, *Phyllostomus hastatus hastatus* (Pallas).

DISTRIBUTION.—Presently known only from the Mt. Tamana Main Cave of central Trinidad.

DISCUSSION.—The radial system in the forewings of this species is variable, sometimes differing between the right and left pair of wings on the same specimen. An examination of several specimens has shown the most common condition is to have veins 9 and 10 shortly stalked and 7 and 8 distinctly separate.

The larvae are reported by Darlington (in litt.) to normally occur over the surface of moist but well drained bat guano; occasionally they may be observed crawling, dragging their case along, up the walls of the cave, perhaps where they attach for pupation. The adults are usually seen resting on the guano and, when disturbed, seldom fly more than a few inches above the surface.

Although ten species of bats have been reported from Tamana Main Cave, *Tetrapalpus trinidadensis* seems to be largely restricted to the piles of guano deposited by *Phyllostomus hastatus hastatus*. These piles accumulate because *Phyllostomus* bats occur in only certain limited areas of the cave. It also appears that none of the other bats roost in sufficient density to create such piles. Why *T. trinidadensis* should be so restricted is not known at present, but it may be due to several factors. Some of these factors are presumably being studied by Miss Darlington.

Tetrapalpus is apparently a troglophile, although it may be more confined to a cave existence than certain other troglophilic tineids, such as *Amydria arizonella* Dietz. The latter is a widespread species ranging over much of the southern United States. It appears to be the most common moth frequenting caves in this country and is particularly abundant in the Bat Cave at Carlsbad Caverns. However, this species is often encountered over its range far from any cave and probably also lives in the nests of various mammals (i.e., a facultative troglophile). When the Microlepidoptera of Trinidad are better known, *Tetrapalpus* may also be shown to occur in a variety of habitats. However, it is perhaps worthy to note one atypical feature present in *T. trinidadensis*, and not so developed in most Tineidae, which apparently is an adaptation toward cave existence; i.e., the elongate antennae. Species of troglophilic Tineinae collected or examined by the author from other regions, particularly the Indo-Australian area, also possess antennae significantly longer than that of most members of this subfamily. If ever a truly troglotic or obligate troglophilic moth is discovered, then likely it will be a member of the subfamily Tineinae.

It has been noted (fig. 14) that ocelli are lacking in *Tetrapalpus* larvae, but from a biospeleological standpoint this apparently has little

significance as several tineid genera (e.g., *Tineola*) never reported from caves also lack larval ocelli. The larva of *Amydria arizonella* has not been studied, although the larva of a closely related species, *A. effrentella*, is known not to possess ocelli (Johnson and Martin, 1969).

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**A NEW SPECIES OF GARGAPHIA LACE BUG
FROM BEANS IN COLOMBIA
(HEMIPTERA: TINGIDAE)**

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ABSTRACT—A population of lace bugs of the genus *Gargaphia* found attacking bean plants in Colombia is described as *G. sanchezi*, n. sp. near *G. nigrinervis* Stål. Probable repeated occurrence of this lace bug on beans is attested to by another Colombian series collected on this same host forty years previously.

This plant-feeder whose adults and nymphs attack beans in Colombia is apparently unnamed. The description is based on two Colombian series collected forty years apart on that host.

***Gargaphia sanchezi*, n. sp.**

Diagnosis: *Gargaphia sanchezi* belongs to that group of tropical American species members of the genus, including *G. nigrinervis* Stål to which it is most closely related, recognized by the combination of the broad costal area with four to six cells across its widest part, the